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ELEOCHARIS ×*INAEQUILATERA* (CYPERACEAE), A NEW HYBRID SPIKERUSH FROM THE COASTAL PLAIN OF LOUISIANA AND TEXAS

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ABSTRACT

Eleocharis ×inaequilatera D.J. Rosen & C. Reid, **nothosp. nov.**, a new sterile hybrid spikerush, is described from the coastal plain of Louisiana and Texas. The hybrid is hypothesized to result from crossing of *E. cellulosa* Torr. and *E. quadrangulata* (Michx.) Roem. & Schult., based on intermediacy of characteristics of the culm in the hybrid and frequent sympatry of these two species in wetlands throughout the hybrid's known range.

Over a decade of field work in the Gulf Coastal plain aimed in most cases at collecting members of *Eleocharis* subg. *Limnochloa* led to collections of a sterile, asexually reproducing *Limnochloa* at five different sites throughout the coastal plain of Louisiana and Texas. This entity was encountered in wetlands where both *E. cellulosa* Torr. and *E. quadrangulata* (Michx.) Roem. & Schult. (or at least one of these species) were also present. We describe this plant as a single nothotaxon apparently resulting from independent crossing events between the same putative parents.

Eleocharis* ×*inaequilatera D.J. Rosen & C. Reid, **nothosp. nov. TYPE: USA. Louisiana.** Beaureguard Parish: Seasonally flooded pond surrounded by pine forest N of Arco Road, 1.7 km from its intersection with Parish Rd 33, locally dominant with *Eleocharis cellulosa* and *E. quadrangulata*, 27 Aug 2010, *D.J. Rosen, C. Reid, & L. Urbatsch 5048* (holotype: TEX; isotypes: BRIT, LSU, NO, US, VSC). Figure 1.

Culm cross-section immediately below the spikelet intermediate between the obscurely 3-angled to subtrigonous *E. cellulosa* and the acutely and unequally quadrangular *E. quadrangulata*.

Plants perennial. **Roots** coarse, fibrous, dark gray-brown; rhizomes long, 1.8–3 mm thick. **Culms** to 85 cm × 2–3.2 mm, soft when fresh, internally spongy-aerenchymatous with incomplete transverse septa, unequally quadrangular, the angles never sharp, the faces more or less flat but never deeply concave, the widest about 2× times that of the narrowest giving the culms a nearly trigonous outline. **Sheaths** membranous, loose, friable, orangish to tan basally, maroon distally, apically oblique, the apex usually extended into a soft awn. **Spikelets** cylindric, 2.9–6.5 cm × 3–3.6 mm, first scale amplexicaul and appearing as continuation of culm; floral scales appressed (in both fresh plants and after drying), ovate to broadly ovate, apex broadly rounded, distal 0.3–0.5 mm hyaline-erose, central area broadly keeled from base to near middle, 4.5–6.2 × 3.2–3.6 mm, with many fine longitudinal cellular-lineate veins, midvein evident only in adaxial view, centrally indurate, stramineous, adaxially sparsely to densely red-maculate, abaxially sparsely red-maculate with a dark reddish brown band near apex. **Flowers** with 7–8 perianth bristles; bristles straight to tortuous, fine,

smooth or infrequently minutely nodulose (seen only at high [40X] magnification) at the tips; stamens 3; anthers 1.6–2.9 mm long, yellow; style 3-fid. **Achenes** aborted.

The name of this hybrid spikerush describes the unequal nature of the four-sided culms.

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UNIVERSITY OF TEXAS HERBARIUM
HOLO TYPE OF
Eleocharis ×inaequilatera
D.J. Rosen & C. Reid
CYPERACEAE
U.S.A., LOUISIANA
Beauregard Parish
HOLOTYPE
Eleocharis × inaequilatera D.J. Rosen & C. Reid
Take Neale Oilfield Road (Parish Rd. 33) 4.6 km E of its intersection with Hwy. 110 in the town of Merryville. Turn left on Arco Rd. and travel 1.7 km. Seasonally flooded pond surrounded by pine forest N of Arco Rd. Locally dominant perennial with Eleocharis cellulosa, E. quadrangulata, Hydrolea ovata, Rhynchospora corniculata, Ludwigia linearis, Juncus elliottii, and Xyris sp.
GPS – N30.77259 W93.48170 (WGS 84)
D.J. Rosen 5048
C. Reid, L. Urbatsch
27 August, 2010
00208802

Figure 1. Holotype of *Eleocharis* ×*inaequilatera*.

Additional specimens examined. Louisiana. Beauregard Par.: Type locality, 8 Oct 2008, *Reid and Allain 6844* (topotype: LSU). St. Tammany Par.: at the corner of Bertha Lane and Mildred Road, common colonial herbs in marsh along roadside with *Juncus roemerianus* and *Spartina patens*, 8 Apr 1999, *Rosen & Jones 840* (NO). **Texas**. Calhoun Co.: S of Hwy. 185, 4.1 mi E of Seadrift, occurs in a few clonal stands in roadside ditch with *Sagittaria* sp., *Nymphaea* sp., *Cyperus haspan*, *Ludwigia* spp., *Bacopa* sp., *Echinodorus* sp., *Rhynchospora* spp., *Spartina patens*, *Eleocharis cellulosa*, *Schoenoplectus pungens*, and *Mitreola* sp., 24 Jul 2004, *Rosen & Combs 3017* (NY, TEX). Galveston Co.: Coastal pimple mound prairie S of Hitchcock, ca. 2.7 mi S of the intersection of Hwy 6 and FM 2004, occasional in shallow water and on mud along irrigation canal and ditches that bisect the prairie, with *Eleocharis quadrangulata* and *E. cellulosa*, 19 Aug 2004, *Rosen & Schubert 3052* (BRIT, SBSC, TEX, VDB). Jefferson Co.: on and E of private gravel ranch road, ca. 3 km S of Wilber Rd, near the Big Hill Oil Field, a strongly rhizomatous perennial forming large stands in coastal wetlands with *Spartina patens*, *Cyperus* spp., *Schoenoplectus californicus*, *Eleocharis quadrangulata*, *E. cellulosa*, *Rhynchospora corniculata*, *Ludwigia* sp., *Sagittaria lancifolia*, and *Typha latifolia*, 28 Aug 2007, *Rosen 4399* (TEX, MICH, US).

Figure 2. Second author near clonal stand of *Eleocharis* ×*inaequilatera* at the type locality.

Eleocharis* subg. *Limnochloa

Eleocharis cellulosa and *E. quadrangulata* belong to subg. *Limnochloa*, a group of over 35 species distributed throughout tropical and subtropical regions worldwide, most being robust emergent plants forming extensive stands in wetlands. Species in the subgenus are readily distinguished from other spikerushes by a combination of cartilaginous floral scales with prominent longitudinal veins, culms that are usually as thick as the cylindrical spikelets, and biconvex (or rarely trigonous) achenes with usually large polygonal epidermal cells arranged in longitudinal rows (González-Elizondo & Peterson 1997). Identification of species in this group relies on features of

mature achenes, such as shape and arrangement of the pericarpial cells and the persistent style base (or tubercle), and secondarily on culm cross-sectional shape, which ranges from 3-5 sharp angles to terete.

Hybridization in spikerushes

Hybridization in spikerushes in North America is probably not uncommon but is likely under-reported. A few hybrid spikerushes have been described on the basis of sympatry of their parents and intermediacy of morphological characters (Catling & Hay 1993; Catling 1994) and additionally utilizing DNA markers in hybrids involving *Eleocharis cellulosa* (Košnar et al. 2010). In all of these hybrids, emphasis is placed on characteristics of the achene (a rich source of data absent in our new sterile hybrid). However, characteristics of culm cross-sectional shape are intermediate between the putative parent species of *E. compressa* Sull.× *E. erythropoda* Steud. (Fig. 5 in Catling 1994).

Formation of *Eleocharis ×inaequilatera*

Eleocharis cellulosa and *E. quadrangulata* are sympatric in Alabama, Arkansas, Florida, Goergia, Louisiana, Mississippi, North Carolina, South Carolina, and Texas. Evidence supporting the hybrid origin of *E. ×inaequilatera* includes its occurrence at multiple locations of parental sympatry and culm cross-sectional shape immediately below the spikelet that is intermediate between the obscurely 3-angled to sub-trigonous *E. cellulosa* and the acutely and unequally quadrangular *E. quadrangulata* (Fig. 3). In *E. ×inaequilatera* and *E. quadrangulata* there are five conspicuous vascular bundles embedded in aerenchymatous tissue, compared to three in *E. cellulosa* (Fig. 3). *Eleocharis ×inaequilatera* could easily be misidentified as the triquetrous stemmed *E. acutangula* (Roxb.) Schult. or *E. mutata* (L.) Roem. & Schult. (*Rosen & Jones 840* is annotated by a botanist as *E. acutangula*) as the fourth angle in *E. ×inaequilatera* is sometimes scarcely noticeable in the field or herbarium specimens. Plants with a more defined fourth angle might be misidentified as *E. quadrangulata*.

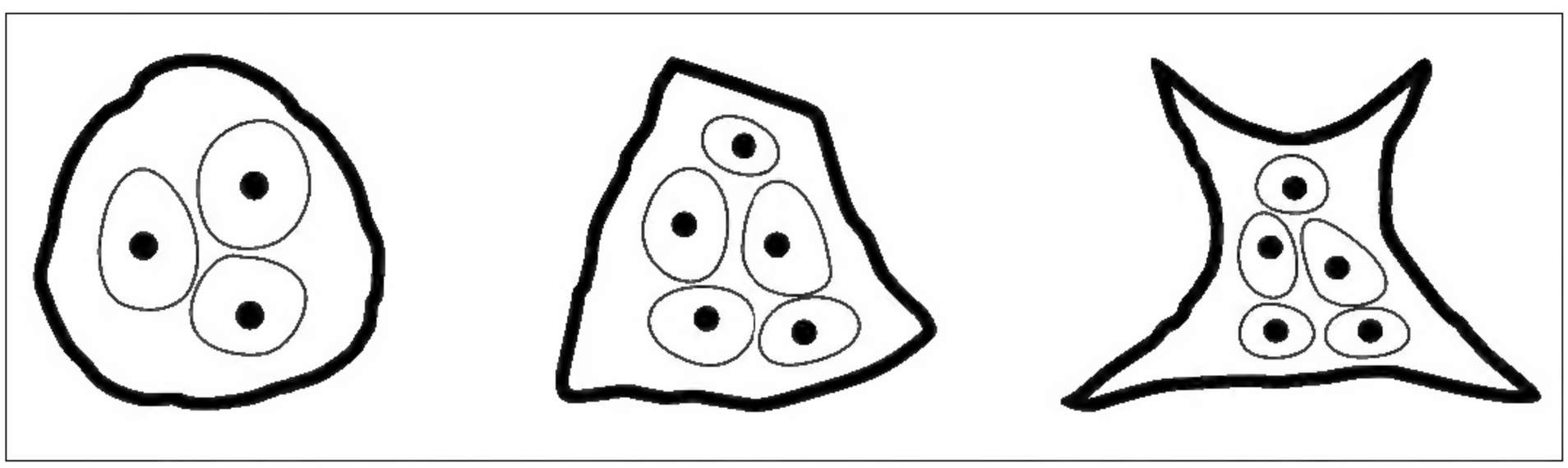

Figure 3. Comparison of culm cross-sectional shape and vascular bundle arrangement immediately below the spikelet of (left) *Eleocharis cellulosa*, (center) *E. ×inaequilatera*, and (right) *E. quadrangulata*

The morphology of *Eleocharis ×inaequilatera* from all sites appears quite consistent. Several sites visited repeatedly over time by the first author saw a decrease in cover of *E. cellulosa* and *E. quadrangulata* and an increase of *E. ×inaequilatera* by asexual reproduction. Rapid spread by rhizomes of *E. ×inaequilatera* may quickly reduce cover of the parental species resulting in extensive clonal stands (Fig. 2). Other hybrid plants have been shown to exhibit superior fitness over the parental species at the point of contact (Arnold & Hodges 1995). The type locality (Fig. 2) presents an almost ideal field experiment, as it is a small (ca. 1 ha), ephemeral, freshwater pond where the hybrid covers approximately 30% of the area and both parents occur in small clumps on the edge of the clonal stand (Fig. 2).

Both parental species are ecologically important, often forming extensive stands where they provide cover and food for wetland wildlife (personal observation by the authors). The resulting hybrid seemingly outcompetes the parents, which might affect habitat structure and wildlife value. More field and greenhouse studies investigating the hybrid's competitive vigor and its potential impact on biodiversity would be important.

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